

# Sondex Settlement System

## Applications

The Sondex settlement system is used with inclinometer casing to monitor settlement and heave in excavations, foundations, dams, and embankments.

Data from the Sondex indicates the depths at which settlement has occurred as well as the total amount of settlement.

## Operation

The Sondex system consists of a portable readout, sensing rings, and Sondex pipe.

The drawing at right shows Sondex pipe with sensing rings installed in a borehole. The sensing rings can be attached to the pipe at regular intervals or at depths of interest.

The annulus between the borehole wall and the Sondex pipe is filled with soft grout. This couples the pipe to the surrounding ground, so that the pipe and rings move with settlement or heave.

The readout consists of a reel with a built-in voltmeter, a cable, and a probe. To obtain measurements, the operator draws the probe, with a survey tape attached, up through the inclinometer casing. The buzzer sounds when the probe nears a ring, and the voltmeter peaks when the probe is aligned with the ring. The operator then refers to the survey tape and records the depth of the ring.

Settlement and heave are calculated by comparing the current depth of each ring to its initial depth.



## Downhole Components

**Inclinometer Casing:** Use flush coupled casing, such as Slope Indicator's QC casing, so that the Sondex pipe can move freely.

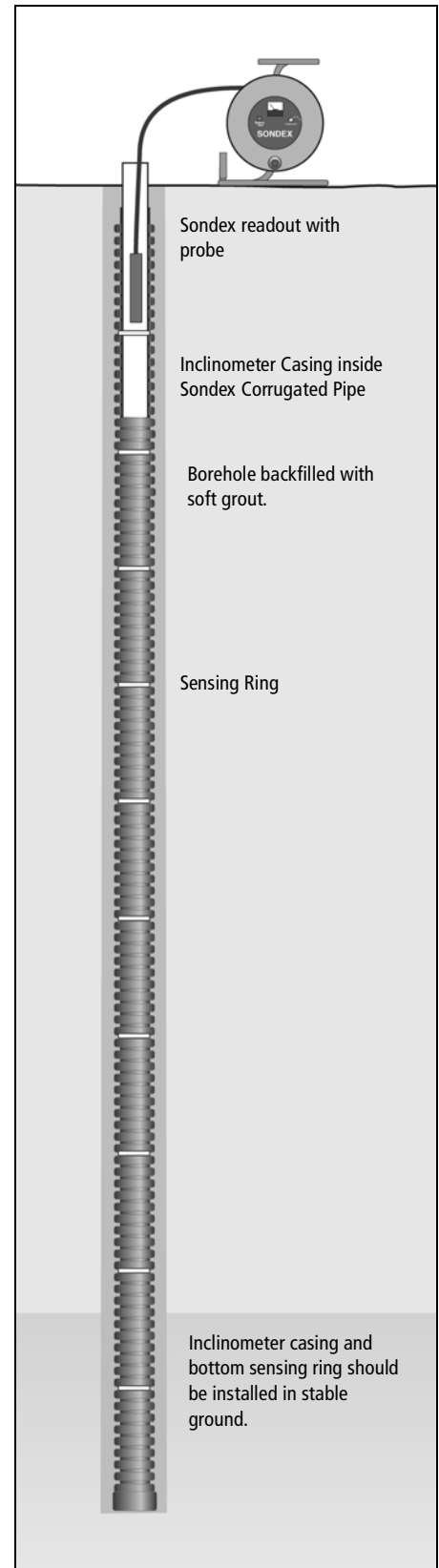
**Sondex Pipe and Couplings:** Sondex pipe is usually cut to ten-foot lengths for easier installation with the inclinometer casing, which is also supplied in 10-foot lengths.

The Sondex pipe must be sealed at the bottom and at each coupling so that grout does not enter the space between the pipe and the casing.

**Sensing Rings:** Sensing rings, (stainless steel straps) can be fixed to the Sondex pipe by the user. Factory attachment is also available.

## Advantages

- Measurements indicate not only the total settlement, but also the "incremental" settlement at the depth of each ring. Any number of the economical sensing rings can be installed.
- Sondex pipe slides freely along inclinometer casing, eliminating the need for telescoping casing sections.



**SONDEX READOUT**

Readout with 50 m cable . . . . .	50810305
Readout & 100 m cable . . . . .	50810310
Readout & 150 m cable . . . . .	50810315
Readout & 150' cable . . . . .	50810015
Readout & 300' cable . . . . .	50810030
Readout & 500' cable . . . . .	50810050

Sondex readout includes reel, electronics, batteries, laser-marked cable, and probe. Survey tape is not included.

**Resolution:** English-unit cable has 0.01 foot graduations. Metric-unit cable has 2 mm graduations. Graduations are marked by laser and are as durable as the cable jacket. Resolution of survey tape is typically 0.01 foot or 1 mm.

**Repeatability:** Readings are typically repeatable to  $\pm 4$  mm or  $\pm 0.15$  inch. Greater precision is possible when user fabricates a reference stand that incorporates a vernier dial gauge.

**Probe Diameter:** 43mm (1.7") OD.

**Temp Range:** -20- 50°C (0- 120°F).

**Batteries:** 3 AA batteries.

**Reel Diameter:** 230 or 280 mm (9 or 11").

**SONDEX PIPE**

Sondex Corrugated Pipe, 3" ID . .	50801600
Sondex Corrugated Pipe, 4" ID . .	50801700

Corrugated polyethylene drain pipe, generally installed in 10 foot lengths. 3" ID pipe has 3.625" OD and is used for 70 mm  $\cdot$  2.75" inclinometer casing. 4" ID pipe has 4.3" OD and is used for 85mm  $\cdot$  3.34" casing. Pipe is rated to 80°C (176°F). Specify number of feet required. Does not include couplings and sensing rings.

**Coupling, 3" ID . . . . .** 50801602

**Coupling, 4" ID . . . . .** 50801702

For joining lengths of corrugated pipe.

**Cap, 3" ID . . . . .** 50801601

**Cap, 4" ID . . . . .** 50801701

For bottom of corrugated pipe.

**Mastic Tape . . . . .** 51003800

For sealing Sondex pipe couplings. Mastic is applied to gaps in coupling. Tape is then wrapped over coupling. Finally, cable-ties are strapped on to provide strength.

**SENSING RINGS**

Sensing Ring, Factory Installed . . .	50801800
Sensing Ring, User Installed . . . .	02842004

Stainless steel straps can be factory installed at user-specified intervals. Factory installation includes overwrapping with mastic and tape to protect against corrosion. Rings can also be installed by the user.

**INCLINOMETER CASING**

Choose a casing that has flush couplings, such as Slope Indicator's QC casing or Standard casing. See data sheet for casing.